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MAKERERE UNIVERSITY BUSINESS SCHOOL

DEVELOPING A JOBLINK MANAGEMENT PLATFORM FOR EMPLOYEES AND EMPLOYERS IN UGANDA

BY

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A project proposal submitted to the faculty of computing of Makerere University Business School in partial fulfillment of the requirements for the award of the degree of Bachelor of Business Computing of Makerere University.

23rd November 2025

DECLARATION

To the best of our knowledge, we, the undersigned, declare that this proposal is our original work and has never been published and/or submitted for any award in any other University or Higher Institution of Learning.

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APPROVAL

This Project Proposal has been submitted with my approval as a supervisor, and my signature is appended here.

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1. INTRODUCTION

This section introduces the proposal JobLinkUG system and its envisioned Ugandan employment context. It covers the project's background problem statement key objectives, project scope and anticipated significance and foundation assumptions

1.1 Project Background

Digital job platforms have transformed global recruitment, with LinkedIn serving over a Billion users and Glassdoor hosting millions of Job listings alongside one eighty million company reviews demonstrating scalable, transparent employment markets

Uganda's employment landscape presents critical challenges despite growth in digital adoption. With over 75% of Ugandans under the age of 30 and youth unemployment at 13% demographic is severely fragmented, with over 70% of workers in the informal sector relying on scattered sources including WhatsApp groups, Facebook pages, and word-of-mouth networks to find opportunities. BrighterMonday Uganda, the national leading portal with 200,000 users, has facilitated 10,000 placements, demonstrating measurable digital adoption (Nyombi, 2025) . However, existing platforms do not have intelligent matching algorithms that offer only rudimentary keyword searches provide limited employer verification, and suffer from fraudulent postings that erode trust. (Daily Monitor, 2024).

This project is being developed by Business Computing students under the Faculty of Computing and Informatics at Makerere University Business School. As final-year capstone work, the team aims to address Uganda's employment challenges through applied research leveraging skills in full-stack development, AI/ML implementation, and Design Science Research methodology acquired over three years of study. The faculty provides technical resources, supervisory expertise, and access to industry networks for testing and validation.

JobLinkUG addresses identified gaps through centralized AI-enhanced platform designs tailored to Uganda's context. Integrating semantic job matching using TF-IDF and cosine Similarity algorithms (Nadar et al., 2024) employer verification workflows, and mobile-first design for low-bandwidth environments, the platform aims to deliver recruitment efficiency beyond current offerings while serving both formal and informal sector workers.

1.2 Statement of the problem

Ideally, job seekers and employers would connect through a unified system that consolidates credible opportunities and intelligently matches candidates to sustainable roles. In reality Ugandan job seekers navigate scattered sources including job boards, WhatsApp groups and word-of-mouth networks, as no single platform consolidates the national employment opportunities. This results in time-consuming searches, where qualified candidates and legitimate employers struggle to connect with opportunities, frequently missing out on opportunities and spending excessive effort filtering through sophisticated matching algorithms. As a result, employers receive unsuitable applications, while job seekers erode trust. JobLinkUG addresses these challenges by providing a centralized AI-driven platform that streamlines job searches, enables intelligent matching and creates a secure environment for employment exchange in Uganda.

1.3 Project Goal and Objectives

1.3.1 Project Goal

To design and develop JobLinkUG, an Intelligent job matching platform that improves employment access and recruitment efficiency in Uganda by November 2025.

1.3.2 Project Objectives

To analyze current job searches and recruitment challenges in the Ugandan labor market by June 2025

To design and develop an AI-driven job matching platform with intelligent recommendation features by November 2025

To test and validate the platform's functionality with job seekers and employers by November 2025

1.3.3 Project Scope summary.

Study scope. JobLinkUG development encompasses creating a Next.js web application with TypeScript, featuring Clerk authentication, AI-powered job matching using TF-IDF and Cosine similarity algorithms, employer verification, real-time notifications via Inngest, mobile-responsive design using Tailwind CSS, PostgreSQL database managed through Drizzle ORM, GitHub version control and cloud deployment on Vercel infrastructure.

Geographical scope. The project will target Uganda's employment ecosystem with particular focus on urban and peri-urban areas where internet access is more prevalent. The system is being designed for nationwide deployment, serving job seekers and employers across all regions, while acknowledging infrastructure constraints in rural areas.

Time scope. The study spans twelve months from January to December 2025, including requirements gathering, system design and development user testing, evaluation and documentation.

Key deliverables include requirements specifications, system design documentation, a working prototype deployed on Vercel, user testing reports and comprehensive technical documentation.

The project excludes enterprise-level security hardening, advanced analytics dashboard, deep learning fraud detection and full organizational implementation beyond the pilot phase.

1.4 Anticipated Significance.

JobLinkUG will benefit Uganda's employment ecosystem by providing job seekers with consolidated access to legitimate opportunities through AI-driven matching. Employers will experience dramatically reduced CV screening time and recruitment costs while expanding talent access beyond university graduates into the informal sector, with employer branding features that attract better-fit candidates and reduce turnover. The research team will gain valuable hands-on experience in requirements engineering, user-centered design and iterative prototyping with real end-users.

1.5 Project Assumptions.

Stakeholder availability. Employers, job seekers and students will voluntarily participate in interviews, surveys and pilot testing, providing timely feedback.

AI feasibility. Matching algorithms can be developed without excessive processing power or large datasets.

Technology compatibility. The chosen technology stack will function as expected and remain compatible with project objectives.

REVIEW OF LITERATURE

2. SECTION INTRODUCTION

This literature review examines digital job platforms and AI-driven recruitment systems, analyzes Uganda's labor market challenges including youth unemployment and informal sector dominance, evaluates existing platforms like BrighterMonday and Fuzu and identifies design requirements for developing JobLinkUG as a contextually appropriate job matching system.

2.1 Digital Platforms

Digital platforms, defined as web based or mobile applications that facilitate labor supply and demand matching, have emerged as critical infrastructure in modern economies by addressing information asymmetry in recruitment. Information asymmetry is when employers do not provide complete information about the available job while job seekers remain uninformed of suitable opportunities, resulting in prolonged searches, skill mismatches and suboptimal hiring decisions (Jiang & Zen, n.d.).

By centralizing job posts into one place, standardizing candidate information, and providing the best search mechanisms, digital job platforms reduce transaction costs and improve matching efficiency.

Beyond simple job boards, modern platforms integrate AI to enable semantic search and personalized recommendations. Advanced algorithms like TF-IDF and Cosine Similarity calculate match scores (Yulita et al., 2023) between profiles and descriptions, enhancing accuracy and significantly reducing recruiter workloads.

2.2 Uganda's labor market and digital recruitment

Uganda has one of the world's youngest populations with a median age in the mid-teens and a workforce expanding faster than the formal job market can absorb (Alfonsi et al., 2020). The labor landscape is overwhelmingly dominated by the informal sector, which employs the vast majority of workers in low productivity unregulated jobs. This structure creates significant unemployment challenges, with a substantial portion of young people employed neither in education nor training. The prevalence of informality complicates digital recruitment efforts, as most workers do not have standardized employment histories or formal credentials.

Recruitment remains highly fragmented with job seekers relying on scattered channels such as WhatsApp groups, Facebook pages and unreliable word-of-mouth referrals. While formal platforms like BrighterMonday Uganda successfully connect verified employers with qualified candidates they predominantly serve the formal sector, leaving the vast informal workforce underserved. Trust represents a major barrier to digital adoption, as the proliferation of fraudulent job postings on social media platforms discourages many job seekers from embracing digital tools.

Digital barriers further compound these challenges. High internet costs and limited rural connectivity limit many potential users while most businesses predominantly small and medium enterprises do not have the resources to implement digital recruitment solutions. Despite of these obstacles, government policies such as the National Digital Transformation Roadmap signal a strong commitment to unified digital solutions. This context creates an urgent need for platforms like JobLinkUG that are mobile-optimized, build trust through robust verification mechanisms, and effectively serve both formal and informal sector workers.

2.3 Designing AI-Powered Job Platform

Uganda's job market relies on digital platforms including BrighterMonday Uganda and Fuzu, which facilitate job postings and applications. BrighterMonday Uganda hosts thousands of job listings across various sectors while Fuzu offers job search services and career guidance, connecting employers with job seekers. However, these platforms face significant limitations: job seekers manually search through hundreds of postings without intelligent filtering, employers receive numerous irrelevant applications fraudulent postings remain common with no verification mechanisms and there is no any semantic matching between job requirements and candidate skills. These inefficiencies document the need for AI-powered solutions capable of matching intelligence fraud detection and personalized recommendations.(Hamadneh et al., 2024)

2.3.1 Importance of AI-Driven Job Platforms

AI-driven platforms improve employment results by effectively matching job seekers and employers. They use big data and artificial intelligence to provide best-fit matching, moving beyond simple job listings. Research shows these platforms can significantly reduce candidate screening time, dramatically shorten time to hire and lower recruitment costs substantially while improving hiring accuracy.

In developing countries, these platforms are vital for addressing labor market gaps. East Africa has experienced substantial growth in online job postings outpacing developed regions in recent years. AI-powered matching benefits youth, women and rural job seekers by opening new opportunities and reducing exclusion. By using algorithms that understand skills contextually= AI helps close information gaps and improve wage fairness and employment rates.

AI systems also support fair hiring practices by focusing on skills and competencies over demographic factors. For Uganda, with high youth unemployment and a significant portion of young people employed neither in education nor in training, AI-driven platforms offer key infrastructure for connecting job seekers to relevant opportunities and supporting national goals. Adaptation to local needs and transparency remain essential for success.

2.3.2 Challenges in Developing AI-Powered Job Platforms

Developing AI-powered job platforms in Uganda encounters both technical and contextual challenges. Data scarcity limits training datasets for machine learning algorithms as comprehensive labeled job market data is not always readily available. Infrastructure constraints, including inconsistent internet connectivity, require optimization for low-bandwidth environments to ensure accessibility across diverse geographic regions.

Algorithmic bias risks emerge when training data reflects historical inequities in hiring practices, potentially disadvantaging certain demographics. This challenge is particularly acute in contexts where historical employment data may contain systemic biases. User trust and adoption challenges arise from limited awareness of AI capabilities and legitimate concerns about algorithmic fairness in hiring decisions. Many job seekers and employers remain unfamiliar with how AI-driven matching works and may question its impartiality (Musrifah & Hasanah, 2025).

Verification and fraud prevention require robust mechanisms to authenticate employers and validate job postings, adding significant complexity beyond simple content moderation. Given the prevalence of fraudulent job advertisements, platforms must implement multi-layered verification systems to protect users.

2.4 Design Considerations for Job Platforms

Designing effective AI-driven job platforms in Uganda requires addressing technical and socio-economic constraints distinct from developed countries. Many users face limited digital access and low internet bandwidth, making mobile-first design and offline functionality essential for broad accessibility. Technical architecture should favor scalable cloud deployments with fast, low-data-consumption features that are suitable for Uganda's realities.

To accommodate varying digital literacy, platforms should use intuitive workflows, multilingual interfaces and clear navigation. Simple registration, customizable search, and AI-powered matching with algorithms like TF-IDF and Cosine Similarity can help users find jobs easily.

Security is critical, requiring robust employer verification, fraud detection, and open complaint mechanisms to maintain trust and reduce fake listings (**Daily Monitor, 2024**). Ethical AI demands transparent, explainable algorithms that minimize bias and support both formal and informal sector needs, with local stakeholder feedback guiding development(**Musrifah & Hasanah, 2025**).

2.5 Conclusion

AI-driven job platforms make job matching faster and more efficient. For Uganda, success depends on building solutions that address local infrastructure, mobile access and both formal and informal workforce needs.

RESEARCH METHODS

3 RESEARCH METHODS

This section outlines the methodology framework guiding JobLinkUG's development including the Design Science Research approach, data collection techniques, system design methodologies, and project constraints. The methods selected ensure both academic rigor and practical relevance for creating a functional AI-powered job matching platform that addresses Uganda's labor market inefficiencies.

3.1 Design Science Research (DSR) Approach

Design Science Research (DSR) is a problem-solving methodology focused on creating and evaluating innovative artifacts such as systems, algorithms, or models that address identified real-world problems. Unlike traditional empirical research that studies existing phenomena, DSR emphasizes building practical solutions and demonstrating their utility through careful evaluation making it particularly suitable for information systems development projects (Sordi, 2021). This project adopts DSR to develop JobLinkUG, an AI-powered job matching platform addressing recruitment inefficiencies in Uganda's labor market.

The DSR process comprises of six interconnected stages.

Problem identification. This establishes the research foundation through analysis of Uganda's fragmented job market, postings and inadequate AI-driven matching capabilities.

Objectives definition. It translates identified problems into specific measurable goals including centralizing legitimate job listings, implementing employer verification workflows and deploying semantic matching algorithms.

Design and development. This involves constructing JobLinkUG using Next.js, PostgreSQL with Drizzle ORM and Vercel hosting through iterative prototyping beginning with an MVP.

Demonstration deploys a functional prototype accessible to test users for real-world interaction.

Evaluation. Assesses effectiveness through user satisfaction surveys, focus group discussions and system testing, measuring recommendation relevance, trustworthiness, and usability.

Communication disseminates findings through this proposal, final project report, supervisor presentations and public deployment as an open-source contribution to Uganda’s digital employment ecosystem.

A table showing JobLinkUG Design Science Research Stages: Objectives, Methods, and Key deliverables.

DSR Stage	Objective Addressed	Methods	Deliverables
Problem Identification	Objective 1. Analyze the current job matching landscape	Interviews, literature review, Platform analysis	Problem statement Requirements document
Objective Definition	Objectives 1-3: Define project goals	Stakeholder Workshops objectives mapping	SMART objectives, success criteria (75% SUS score, 40%-time reduction)
Design and Development	Objective 2. Design and development platform	Next.js, Postgres, Drizzle, Agile sprints	MVP prototype, Database schema, UML diagrams, Wireframes
Demonstration	Objective 3: Test system	Prototype deployment (Vercel), User testing sessions	Functional system, user feedback logs
Evaluation	Objective 3: Validate effectiveness	SUS Questionnaires, Focus groups, performance metrics, and AI accuracy testing	Evaluation report, Usability scores, Recommendation
Communication	All objectives. Share Findings	Project report, Presentation, GitHub deployment, Documentation	Final report, Live system, Defense presentation

The six DSR stages are organized into three interconnected phases that ensure both a strong research foundation and practical usefulness.

Phase 1, Knowledge Foundation builds JobLinkUG on existing research through comprehensive literature review of AI-driven job platforms, matching algorithms and Uganda's labor market studies documented in Section 2 ensuring the system learns from proven theories and successful practices.

Phase 2. Build and Refine involves creating and improving the platform through repeated cycles of design, development, testing and evaluation allowing JobLinkUG to evolve based on user feedback and technical lessons learned.

Phase 3. Real World Application ensures that the platform actually works in practice through testing with 30 real users (20 job seekers and 10 employers) in Uganda, gathering their feedback to improve JobLinkUG's features and confirming it solves the actual recruitment problems identified in Section 1.2. These three phases work together throughout the project, with knowledge from research guiding design decisions, iterative development producing and refining the platform and real-world testing validating that JobLinkUG effectively addresses Uganda's job market challenges.

3.2 Target Users and Stakeholders

JobLinkUG targets two primary user groups within Uganda's labor market. Job seekers include unemployed youth, underemployed workers and career changers actively searching for employment opportunities across various sectors and skill levels. Employers include SMEs, NGOs, corporate HR departments and recruitment agencies seeking efficient candidate identification and hiring workflows. The target population comprises 100 active users drawn from Kampala and surrounding districts consisting of 70 job seekers and 30 employers who regularly interact with digital job platforms. Secondary stakeholders include government employment agencies, vocational training institutions and labor market researchers who benefit from improved job matching and reduced youth unemployment rates.

3.2.1 Sampling Design

This study employs purposive sampling to select 30 participants for JobLinkUG evaluation, aligning with established guidelines that sample size of 30 or more are appropriate for most research studies as the Central Limit Theorem ensures normal distribution of sample means at this

threshold (Denieffe, 2020). The sample comprises 20 job seekers and 10 employers selected based on predetermined criteria ensuring diversity and representativeness.

Job seekers are selected across varied educational backgrounds (secondary, diploma ,degree) different unemployed durations (0-3 months, 3-6 months, 6+ months) and age groups (18-24, 25-35, 36+ years).

Employers are selected from diverse organizational types like 5 SMEs, 3 NGOs, 2 corporate sectors, for example, technology, agriculture, services and hiring frequencies, which are weekly, monthly, and quarterly recruiters.

This user-focused split prioritizes job seeker feedback as the primary platform beneficiaries while ensuring sufficient employer representation to evaluate recruitment features.

3.3 Sources of Project Data

JobLinkUG development draws on primary and secondary data sources. Primary data is collected directly from stakeholders.

Semi-structured interviews with 30 participants (20 job seekers, 10 employers) exploring job search behavior, platform preferences and feature requirements. 2 focus group discussions with 5-7 participants comparing JobLinkUG to existing platforms like BrighterMonday and Fuzu, (3) observation studies documenting user interactions during job searches, applications, and dashboard navigation, and (4) user testing feedback through System Usability Scale (SUS) questionnaires and satisfaction surveys during prototype demonstration and evaluation phases.

Secondary data is sourced from internet-based resources, including government statistical reports on Uganda's labor market from UBOS, policy documents on employment and digital transformation from the Ministry of Gender, Labor and Social Development and academic literature on AI-driven recruitment and semantic matching algorithms reviewed in Section 2, and existing job platform documentation from BrighterMonday and Fuzu, revealing current market features and limitations

3.3.1 Requirements Elicitation Techniques

Three techniques capture stakeholders needs: (1) **Semi-structured interviews** with 30 participants (20 jobs seekers, 10 employees) exploring platforms experiences, desired features, and adoption

willingness ; (2)**Focus groups discussions** with 5-7 participants each (one jobs seeker group, one employes group) comparing JobLinkUG to existing platforms and prioritizing features; and (3) **Observation** during usability testing documenting navigation paths, errors and task completion times , revealing actual user behaviors.

3.4 System Analysis and Design Approaches

JobLinkUG employs Object-Oriented Design (OOD) as the primary analysis approach , justified because it aligns with Next.js and React's components-based architectures .OOD Principles (Misiko, 2020) enable modular development where system components(authentication, matching engine, dashboards) can be developed and tested independently, facilitating parallel workflows and easier debugging (Pérez-González et al., 2024)

Evolutionary prototyping serves as the development method , where an initial MVP is iteratively refined through user feedback cycles. This approach suits JobLinkUG because requirements for an AI-driven platform in Uganda's unique context cannot be fully specified upfront users interaction reveals unanticipated needs. Development follows Agile methodology with 2- week sprints aligned to DSR stages, using Git/GitHub for version control and Vercel continuous deployment.

3.4.2 Design Techniques

Use Case Diagrams identify actors such as Job Seekers, Employer, Administrator and interactions like, Register Account, Post Job, Apply and Receive AI Recommendations.

Entity-Relationship Diagrams model the PostgreSQL database schema defining entities (User, Job , Application, Skill) with relationships ensuring data integrity.

Wireframe created in Figma provide low-fidelity interface prototypes (dashboards, job listings, application forms), facilitating early usability feedback

System Architecture Diagrams depict the three-tier architecture (Next.js frontend with TypeScript and Tailwind CSS, API routes with clerk authentication and Inngest event handling, PostgreSQL database via Drizzle ORM), documenting component interactions and Vercel deployment infrastructure.

3.5 Anticipated Project Constraints

Time constraint limits the 12-month timeline to MVP features only, deferring advanced capabilities like video interviews or blockchain verification to future versions.

Budget Limitations of 802,880 UGX restrict participant incentives to 30 users and exclude paid API services, necessitating free-tier cloud resources and open-source libraries.

Technical constraints include dependency on internet connectivity for real-time matching (Uganda's average 5-15 Mbps in urban areas may cause latency), limited computational resources for complex AI models (requiring lightweight TF-IDF instead of deep learning), and free-tier hosting restriction on Vercel (requiring optimization for 100GB bandwidth monthly limits).

Data availability constraints arise from limited historical job matching datasets in Uganda, requiring synthetic data generation or manual curation for algorithm training and validation.

User adoption Constraints include digital literacy gaps, seekers and employer skepticism toward AI recommendations, addressed through intuitive design and employer verification workflows. Mitigation strategies include Agile sprints for timeline management, an open-source technology stack for cost control, progressive web app design for low-bandwidth optimization, and iterative user testing to enhance adoption.

3.6 Ethical considerations

Several ethical principles guide JobLinkUG development.

Data privacy and confidentiality are maintained through Clerk's secure authentication, encrypted database storage via PostgreSQL, and compliance with Uganda's Data Protection and Privacy Act 2019 (*The Data Protection and Privacy Act, 2019* | RSM Uganda, 2022), ensuring personal information (names, contacts, CVS) remains confidential and accessible only to authorized personnel.

Algorithmic fairness requires continuous monitoring to prevent bias in AI matching recommendations against gender, ethnicity, or socioeconomic status, with regular monitoring to ensure equitable job opportunity distribution across demographic groups (Musrifah & Hasanah, 2025).

Informed consent ensures all 30 participants receive clear information about data collection purposes, usage scope, and voluntary participation rights before engagement.

Transparency mandates clear explanation of how matching algorithms works, allowing users to understand why specific jobs are recommended and providing appeal mechanisms for disputed recommendations.

Employer verification through business registration checks and contact validation addresses frauds concerns while respecting legitimate employer privacy

User autonomy ensures job seekers control profile visibility, application choice, and data sharing preferences, with options to opt out AI recommendations. Research approval from Makerere University Business School ensures compliance with institutional ethical standards for human-centered technology research.

3.7 Project Timeline and Milestones

JobLinkUG development spans 12 months (January-December 2025) across five phases aligned with DSR stages.

Problem Analysis and Requirement Gathering (January-March, 12 weeks) Conducts a comprehensive literature review, stakeholder interviews with 30 (20 job seekers, 10 employers), focus group discussions, and requirement elicitation, documenting user needs and platform constraints.

System Design (April-July, 16 weeks) creates detailed case diagrams, ER diagrams, system architecture specification, and Figma wireframes documenting the three-tier architecture with Next.js, TypeScript, Clerk authentication, Drizzle ORM and Tailwind CSS, alongside algorithm design for TF-IDF matching and employer verification workflows.

Development and Implementation (August-October, 12 weeks) build the MVP through Agile sprints, implementing authentication, job posting interfaces, AI matching algorithms, employer verification, real-time notifications via Inngest and mobile-responsive design deployed iteratively on Vercel with GitHub version control.

Testing and Evaluation(Novermber,4 weeks) conducts comprehensive usability testing with 30 users, administers SUS questionnaires, facilitates two focus groups (job seekers and employers), perform security testing, and refines features based on user feedback.

Documentation and Deployment (December, 4 weeks) finalize project report, prepare presentation materials, complete production deployment and conduct supervisor demonstrations.

3.8 Disclosure and Declaration Statement

This project acknowledges the use of artificial intelligence tools, including Gemini for literature review support, content refinement and citation verification. AI tools including Gemini were used under the supervision and guidance of Mrs. Nyesiga Catherine in accordance with Makerere University Business School's AI Policy for academic work. All AI-generated content has been reviewed, verified and integrated into the proposal by the project team. No conflicts of interest are declared. The project team commits to responsible AI use aligned with MUBS ethical standards

REFERENCES

- Alfonsi, L., Bandiera, O., Bassi, V., Burgess, R., Rasul, I., Sulaiman, M., & Vitali, A. (2020). Tackling Youth Unemployment: Evidence From a Labor Market Experiment in Uganda. *Econometrica*, 88(6), 2369–2414. <https://doi.org/10.3982/ECTA15959>
- Daily Monitor. (2024, June 20). *The Rise of Ghost jobs & job scams in Uganda*. Monitor. <https://www.monitor.co.ug/uganda/brand-book/the-rise-of-ghost-jobs-job-scams-in-uganda-4653014>
- Denieffe, S. (2020). Commentary: Purposive sampling: complex or simple? Research case examples. *Journal of Research in Nursing: JRN*, 25(8), 662–663. <https://doi.org/10.1177/1744987120928156>
- Hamadneh, S., Alshurideh, M. T., Alquqa, E. K., Al Kassem, A., Agha, K., & Alzoubi, H. M. (2024). AI-Driven Talent Acquisition Systems: Transforming Recruitment Strategies in the Digital Age. *2024 2nd International Conference on Cyber Resilience (ICCR)*, 1–6. <https://doi.org/10.1109/ICCR61006.2024.10532893>
- Jiang, M., & Zen, K. (n.d.). *Information Asymmetry in Job Search*.
- Misiko, N. (2020). *A Review of Metrics for Object-Oriented Design*.
- Musrifah, F., & Hasanah, I. A. (2025). Ethical Implications of AI-Driven Recruitment: A Multi-Perspective Study on Bias and Transparency in Digital Hiring Platforms. *Journal of Management and Informatics*, 4(1), 599–616. <https://doi.org/10.51903/jmi.v4i1.140>
- Nadar, T. K., Athulya, S. S., Rahul, S. S., & Meenakshi, K. (2024). Job Recommendation by Content Filtering using TF-IDF and Cosine Similarity. *2024 8th International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC)*, 1585–1590. <https://doi.org/10.1109/I-SMAC61858.2024.10714763>

Nyombi, I. (2025, June 16). From Paper CVs to Predictive Hiring: A New Dawn for Talent

Discovery in Uganda. *BrighterMonday Uganda*.

<https://www.brightermonday.co.ug/discover/from-paper-cvs-to-predictive-hiring-a-new-dawn-for-talent-discovery-in-uganda>

Pérez-González, H. G., Juárez-Ramírez, R., Guerra-García, C., Núñez-Varela, A., Nava-Muñoz,

S., Reyes, F. J. T., Pérez, F. M., & Nwokeji, J. C. (2024). WIP: Object-Oriented Design Education: A Systematic Mapping Study. *2024 IEEE Frontiers in Education Conference (FIE)*, 1–5. <https://doi.org/10.1109/FIE61694.2024.10893398>

Sordi, J. O. D. (2021). *Design Science Research Methodology: Theory Development from Artifacts*. Springer Nature.

The Data Protection and Privacy Act, 2019 | RSM Uganda. (2022, January 27).

<https://www.rsm.global/uganda/insights/assurance-updates/data-protection-and-privacy-act-2019>

Yulita, W., Untoro, M. C., Praseptiawan, M., Ashari, I. F., Afriansyah, A., & Bin Che Pee, A. N.

(2023). Automatic Scoring Using Term Frequency Inverse Document Frequency Document Frequency and Cosine Similarity. *Scientific Journal of Informatics*, 10(2), 93–104. <https://doi.org/10.15294/sji.v10i2.42209>

APPENDICES

PROJECT PROPOSED PROJECT BUDGET

Item	Qty	Unit cost(UGX)	Total (UGX)
Domain name (.com)	1	100,000	100,000
Hosting	1	800,000	800,000
Internet Data	12 months	21,667	260,000
Mobile Airtime	12 months	10,000	120,000
Research Assistants	2 persons	20,000	40,000
Transport (interviews)	30 trips	5,000	150,000
Participant Incentives	30 people	1,000	30,000
Focus Group Refreshments	10 people	5,000	50,000
Printing and Stationery	Lump Sum	-	30,000
Contingency (4%)	-	-	30,000
TOTAL		962,667	1,610,000

DATA COLLECTION TOOLS

INTERVIEW GUIDE FOR JOB SEEKERS

Project: JobLinkUG - AI-Powered Job Matching System

Interviewer: _____

Date: _____

Participant ID: JS-_____ (for anonymity)

Section A: Background Information

1. Age: _____ years
2. Education Level: ☐ Secondary ☐ Diploma ☐ Degree ☐ Other: _____
3. Current Employment Status: ☐ Unemployed ☐ Employed ☐ Underemployed
4. How long have you been searching for a job? _____

Section B: Current Job Search Experience

5. Which platforms do you currently use to search for jobs? (Check all that apply)
 - BrighterMonday
 - Fuzu
 - WhatsApp groups
 - Facebook job pages
 - LinkedIn
 - Other: _____
6. What challenges do you face when using these platforms?
7. How much time do you spend daily searching for jobs? _____
8. Have you ever encountered fake job postings? ☐ Yes ☐ No
If yes, please describe:

Section C: Platform Preferences

9. What features would you like to see in an ideal job matching platform?
10. Would you trust an AI system to recommend jobs for you? ☐ Yes ☐ No ☐ Maybe
Why?
11. How important is mobile phone access to job platforms? (1=Not important, 5=Very important)
1 --- 2 --- 3 --- 4 --- 5
12. Would you be willing to create a detailed profile (skills, experience) if it helps match you with relevant jobs? ☐ Yes ☐ No

Section D: Additional Comments

13. Any other suggestions for improving job search in Uganda?

INTERVIEW GUIDE FOR EMPLOYERS

Project: JobLinkUG - AI-Powered Job Matching System

Interviewer: _____

Date: _____

Participant ID: EMP-_____ (for anonymity)

Section A: Organization Information

1. Organization Type: ☐ SME ☐ NGO ☐ Corporate ☐ Government ☐ Other: _____
2. Industry Sector: _____
3. Company Size: ☐ 1-10 employees ☐ 11-50 ☐ 51-200 ☐ 200+
4. Recruitment Frequency: ☐ Weekly ☐ Monthly ☐ Quarterly ☐ Annually

Section B: Current Recruitment Challenges

5. Which platforms do you use to post job vacancies?
6. What are your biggest challenges in finding qualified candidates?
7. How many applications do you typically receive per job post? _____
8. What percentage of applicants meet your minimum requirements? _____%

Section C: AI-Powered Matching

9. Would you use an AI system that pre-screens candidates and provides match scores? ☐
Yes ☐ No ☐ Maybe
10. What concerns do you have about AI-driven recruitment?
11. What information would you need from job seekers' profiles?
12. How important is employer verification (to reduce fraudulent postings)? (1-5 scale)
1 --- 2 --- 3 --- 4 --- 5

Section D: Platform Features

13. What features would encourage you to use a new job platform?

14. Would you pay for premium features (e.g., top listing, advanced filters)? ☐ Yes ☐ No

If yes, how much per month? _____

Section E: Additional Comments

15. Any other suggestions for improving recruitment in Uganda?

SYSTEM USABILITY SCALE (SUS) QUESTIONNAIRE

Project: JobLinkUG Platform Evaluation

Participant ID: _____

Date: _____

Instructions: For each statement below, indicate your level of agreement using the scale:

1 = Strongly Disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly Agree

STATEMENT	RATING (1-5)
I think I would like to use this system frequently	
I found the system unnecessarily complex	
I thought the system was easy to use	
I think I would need technical support to use this system	
I found the various functions in this system integrated well	
I thought there was too much inconsistency in this system	
I imagine most people would learn to use this quickly	
I found the system very challenging to use	
I felt very confident using the system	
I needed to learn a lot before I could get going with this system	

Additional Feedback:

What did you like most about JobLinkUG?

What needs improvement?

Would you recommend this platform to others? ☐ Yes ☐ No

Gantt-Chart

